**INSTYTUT TECHNIKI BUDOWLANEJ**
PL 00-611 WARSZAWA
ul. Filtrowa 1
tel.: (+48 22) 825-04-71
(+48 22) 825-76-55
fax: (+48 22) 825-52-86
www.itb.pl

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

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# European Technical Assessment

# ETA-18/0432 of 04/06/2018

## General Part

| | |
|---|---|
| **Technical Assessment Body issuing the European Technical Assessment** | Instytut Techniki Budowlanej |
| **Trade name of the construction product** | TAP CE |
| **Product family to which the construction product belongs** | Deformation-controlled expansion anchors for use in non-cracked concrete |
| **Manufacturer** | FRIULSIDER S.p.A<br>Via Trieste 1<br>I-33048 San Giovanni al Natisone (UD)<br>Italy |
| **Manufacturing plant** | Plant 1 |
| **This European Technical Assessment contains** | 11 pages including 3 Annexes which form an integral part of this Assessment |
| **This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of** | European Assessment Document (EAD) 330232-00-0601 "Mechanical fasteners for use in concrete" |

*This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.*

# Specific Part

## 1 Technical description of the product

TAP CE are deformation-controlled expansion anchors. The anchors TAP CE are made of zinc plated steel.

The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

The description of the product is given in Annex A.

## 2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B.

The performances given in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

## 3 Performance of the product and references to the methods used for its assessment

### 3.1 Performance of the product

#### 3.1.1 Mechanical resistance and stability (BWR 1)

| Essential characteristic | Performance |
|---|---|
| Characteristic resistance, displacements | See Annexes C1 to C3 |
| Edge distance and spacing | See Annexes C1 to C3 |

#### 3.1.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|---|---|
| Reaction to fire | Anchors satisfy requirements for Class A1 |
| Resistance to fire | No performance assessed |

### 3.2 Methods used for the assessment

The assessment of fitness of the anchors for the declared intended use has been made in accordance with the EAD 330232-00-0601 "Mechanical fasteners for use in concrete".

## 4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to Decision 96/582/EC of the European Commission the system 1 of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) applies.

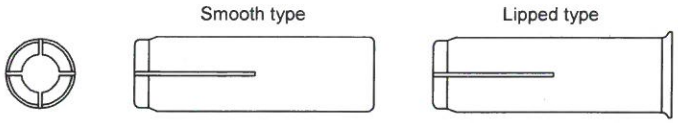
## 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

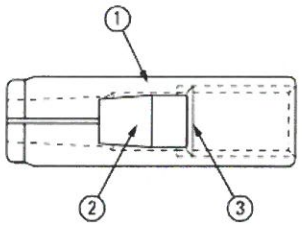
Issued in Warsaw on 04/06/2018 by Instytut Techniki Budowlanej

Krzysztof Kuczyński, PhD
Deputy Director of ITB

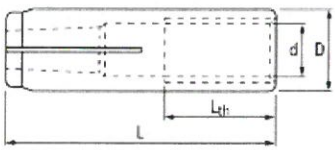


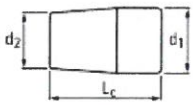

Marking on the body

1. Smooth type: TAP 08...20
2. Lipped type: TAP 08L...20L
3. M12 O.D. Ø16 TAP: TAP 12D/TAP 12DL




① Expansion Sleeve
② Expansion Plug
③ Retainer Disk



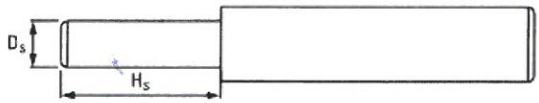




**Table A1.** TAP CE – dimensions and materials

| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Anchor size** | | | **TAP CE08** | **TAP CE10** | **TAP CE 12** | **TAP CE 12D** | **TAP CE16** | **TAP CE20** |
| Expansion sleeve | | | | | | | | |
| Sleeve diameter | D | mm | 10 | 12 | 15 | 16 | 20 | 25 |
| Sleeve length | L | mm | 30 | 40 | 50 | 50 | 65 | 80 |
| Thread | d | - | M8 | M10 | M12 | M12 | M16 | M20 |
| Thread length | $L_{th}$ | mm | 13 | 17 | 21 | 21 | 30 | 30 |
| Expansion plug | | | | | | | | |
| Plug diameter | $d_1$ | mm | 6,5 | 8 | 10,1 | 10,1 | 13,5 | 17,3 |
| Plug diameter | $d_2$ | mm | 5,5 | 6,5 | 8,5 | 8,5 | 11,4 | 16,3 |
| Plug length | $L_c$ | mm | 12 | 15 | 20 | 20 | 27 | 30 |
| Installation pin | | | | | | | | |
| Setting pin diameter | $D_s$ | mm | 6,6 | 7,8 | 9,6 | 9,6 | 13,5 | 15,8 |
| Setting pin length | $H_s$ | mm | 18 | 25 | 30 | 30 | 38 | 50 |

| Materials | | |
|---|---|---|
| **Element** | **Material** | **Protection** |
| Expansion sleeve | Q195 acc. to GB/T 700 | zinc coating (≥ 5 µm); electroplated acc. to EN ISO 4042 |
| Expansion plug | Q195 acc. to GB/T 700 | |

**TAP CE**

**Product description**
Characteristic of the product

**Annex A1**

of European Technical Assessment ETA-18/0432

## SPECIFICATION OF INTENDED USE

**Anchorages subject to:**

- Static and quasi-static loads.

**Base material:**

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Non-cracked concrete.

**Use conditions (environmental conditions):**

- Structures subject to dry internal conditions.

**Design:**

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be transmitted. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static loads are designed in accordance with EOTA Technical Report TR 055.

**Installation:**

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check of concrete being well compacted, e.g. without significant voids.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- Anchor installation such that the effective anchorage depth is complied with.

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|---|---|
| **TAP CE** | **Annex B1**<br>of European Technical Assessment ETA-18/0432 |
| **Intended use**<br>Specification | |

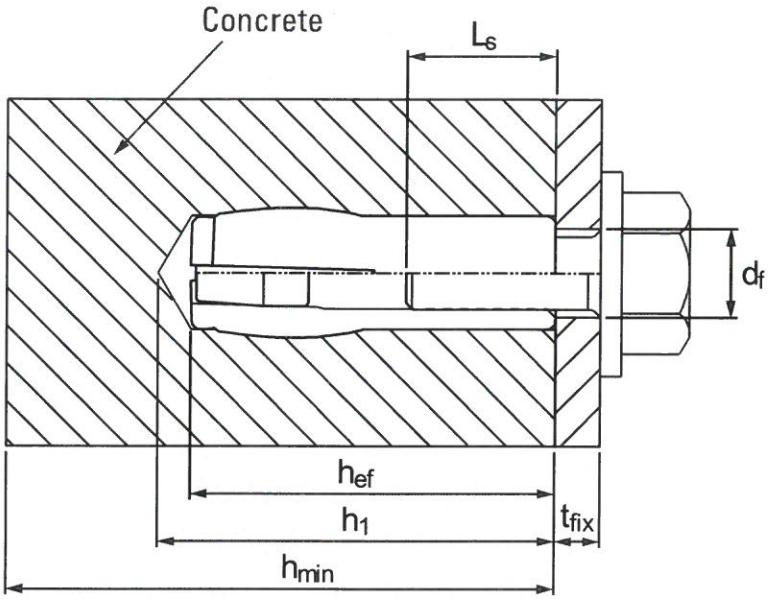


**Table B1:** Installation parameters

| Anchor | | | TAP CE | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **TAP CE08** | **TAP CE10** | **TAP CE 12** | **TAP CE 12D** | **TAP CE16** | **TAP CE20** |
| Effective anchorage depth | $h_{ef}$ | [mm] | 30 | 40 | 50 | 50 | 65 | 80 |
| Drill hole depth | $h_1$ | [mm] | 33 | 43 | 54 | 54 | 70 | 85 |
| Drill hole diameter | $d_0$ | [mm] | 10 | 12 | 15 | 16 | 20 | 25 |
| Installation torque (max) | $T_{inst}$ | [mm] | 8 | 15 | 35 | 35 | 60 | 120 |
| Thickness of concrete member (min) | $h_{min}$ | [mm] | 100 | 100 | 100 | 100 | 130 | 160 |
| Screwing depth (min) | $L_{s,\,min}$ | [mm] | 8 | 10 | 12 | 12 | 16 | 20 |
| Screwing depth (max) | $L_{s,\,max}$ | [mm] | 13 | 17 | 21 | 21 | 30 | 30 |
| Diameter of clearance hole in the fixture | $d_f$ | [mm] | 9 | 12 | 14 | 14 | 18 | 22 |
| Spacing (min) | $s_{min}$ | [mm] | 41 | 54 | 68 | 68 | 88 | 108 |
| Edge distance (min) | $c_{min}$ | [mm] | 41 | 54 | 68 | 68 | 88 | 108 |

Fastening screws or anchor threaded rods:

Steel, property class 4.6 / 4.8 / 5.8 / 6.8 / 8.8 according to EN-ISO 898-1; thickness of galvanizing ≥ 5 µm

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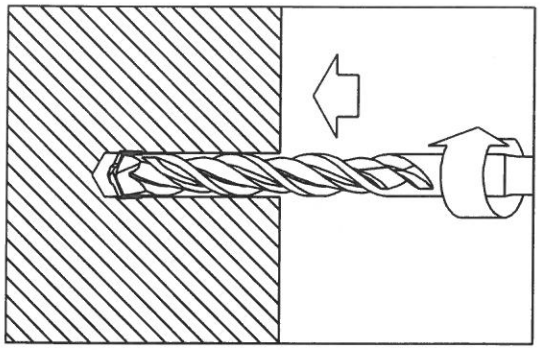
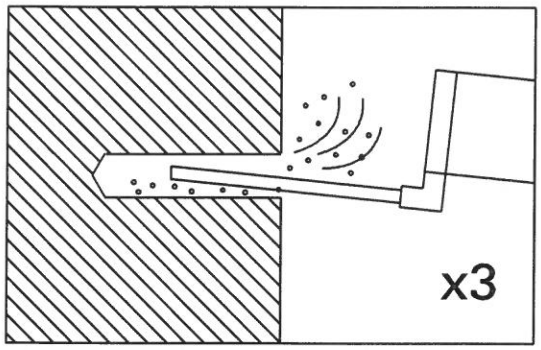
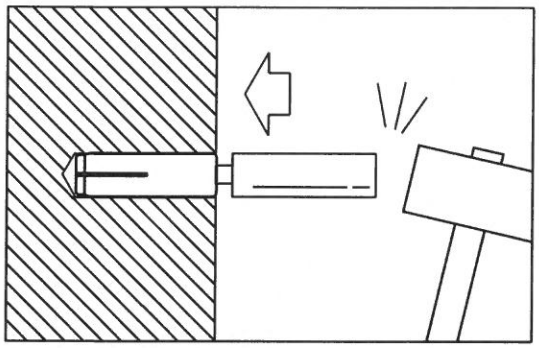
|---|---|
| **TAP CE** | **Annex B2**<br>of European Technical Assessment ETA-18/0432 |
| **Intended use**<br>Installation parameters | |



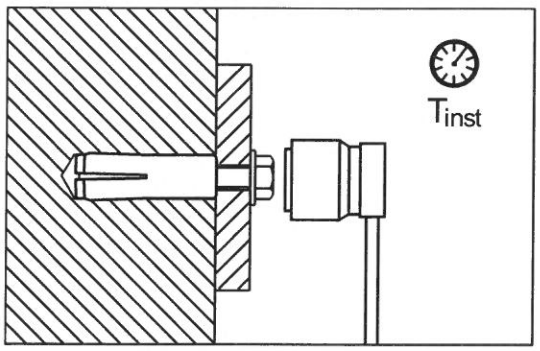
Drill hole with rotary percussive machine. Drill to a required depth.




Blow out dust at least 3 times with a hand pump.



Put the anchor into the drill hole, hammering with the installation tool, until the setting pin fully insert into the anchor.




Fix the fixture by screw or threaded rod with max. $T_{inst}$.

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|---|---|
| **TAP CE** | **Annex B3**<br>of European Technical Assessment ETA-18/0432 |
| **Intended use**<br>Installation instruction and tools | |

**Table C1: Characteristic resistance to tension load in non-cracked concrete (static and quasi-static loads)**

| Anchor | | | | TAP CE | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | | TAP CE08 | TAP CE10 | TAP CE 12 | TAP CE 12D | TAP CE16 | TAP CE20 |
| **Steel failure** | | | | | | | | | |
| Steel failure with threaded rod grade 4.6 | | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 14,6 | 23,2 | 33,7 | 33,7 | 62,8 | 98,0 |
| Partial safety factor | | $\gamma_{Ms}$ 2) | [-] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Steel failure with threaded rod grade 4.8 | | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 14,6 | 23,2 | 33,7 | 33,7 | 62,8 | 98,0 |
| Partial safety factor | | $\gamma_{Ms}$ 2) | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Steel failure with threaded rod grade 5.8 | | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 18,3 | 29,0 | 42,2 | 42,2 | 78,5 | 122,5 |
| Partial safety factor | | $\gamma_{Ms}$ 2) | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Steel failure with threaded rod grade 6.8 | | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 22,0 | 34,8 | 50,6 | 50,6 | 94,2 | 147,0 |
| Partial safety factor | | $\gamma_{Ms}$ 2) | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Steel failure with threaded rod grade 8.8 | | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 29,3 | 46,4 | 67,4 | 67,4 | 125,6 | 196,0 |
| Partial safety factor | | $\gamma_{Ms}$ 2) | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| **Pullout failure** | | | | | | | | | |
| Characteristic resistance in non-cracked concrete C20/25 | | $N_{Rk,p}$ | [kN] | 1) | 1) | 1) | 1) | 25 | 30 |
| Installation safety factor | | $\gamma_2$ 3) = $\gamma_{inst}$ 4) 5) | [-] | 1,2 | 1,2 | 1,4 | 1,2 | 1,2 | 1,2 |
| Increasing factor | concrete C30/37 | $\psi_c$ | [-] | 1,22 | 1,22 | 1,22 | 1,22 | 1,22 | 1,22 |
| | concrete C40/50 | | [-] | 1,41 | 1,41 | 1,41 | 1,41 | 1,41 | 1,41 |
| | concrete C50/60 | | [-] | 1,55 | 1,55 | 1,55 | 1,55 | 1,55 | 1,55 |
| **Concrete cone failure and splitting failure** | | | | | | | | | |
| Effective embedment depth | | $h_{ef}$ | [mm] | 30 | 40 | 50 | 50 | 65 | 80 |
| Factor for non-cracked concrete | | $k_1$ 3) = $k_{ucr}$ 4) | [-] | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 |
| Factor for non-cracked concrete | | $k_{ucr,N}$ 5) | [-] | 11,0 | 11,0 | 11,0 | 11,0 | 11,0 | 11,0 |
| Installation safety factor | | $\gamma_2$ 3) = $\gamma_{inst}$ 4) 5) | [-] | 1,2 | 1,2 | 1,4 | 1,2 | 1,2 | 1,2 |
| Increasing factor | concrete C30/37 | $\psi_c$ | [-] | 1,22 | 1,22 | 1,22 | 1,22 | 1,22 | 1,22 |
| | concrete C40/50 | | [-] | 1,41 | 1,41 | 1,41 | 1,41 | 1,41 | 1,41 |
| | concrete C50/60 | | [-] | 1,55 | 1,55 | 1,55 | 1,55 | 1,55 | 1,55 |
| Characteristic resistance to splitting | | $N^0_{Rk,sp}$ | [kN] | 1) | 1) | 1) | 1) | 25 | 30 |
| Characteristic spacing | concrete cone failure | $s_{cr,N}$ | [mm] | 90 | 120 | 150 | 150 | 195 | 240 |
| | splitting failure | $s_{cr,sp}$ | [mm] | 210 | 280 | 350 | 350 | 455 | 560 |
| Characteristic edge distance | concrete cone failure | $c_{cr,N}$ | [mm] | 45 | 60 | 75 | 75 | 97 | 120 |
| | splitting failure | $c_{cr,sp}$ | [mm] | 105 | 140 | 175 | 175 | 227 | 280 |

| | |
|---|---|
| **TAP CE** | **Annex C1** of European Technical Assessment ETA-18/0432 |
| **Performances** Characteristic resistance to tension loads | |

## Table C2: Characteristic resistance to shear load in non-cracked concrete (static and quasi-static loads)

| Anchor | | | TAP CE | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **TAP CE08** | **TAP CE10** | **TAP CE 12** | **TAP CE 12D** | **TAP CE16** | **TAP CE20** |
| **Steel failure without lever arm** | | | | | | | | |
| Steel failure with threaded rod grade 4.6 | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}{}^{3)4)} = V^0_{Rk,s}{}^{5)}$ | [kN] | 7,3 | 11,6 | 16,9 | 16,9 | 31,4 | 49,0 |
| Factor considering ductility | $k^{3)} = k_2{}^{4)} = k_7{}^{5)}$ | [-] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 |
| Steel failure with threaded rod grade 4.8 | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}{}^{3)4)} = V^0_{Rk,s}{}^{5)}$ | [kN] | 7,3 | 11,6 | 16,9 | 16,9 | 31,4 | 49,0 |
| Factor considering ductility | $k^{3)} = k_2{}^{4)} = k_7{}^{5)}$ | [-] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 5.8 | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}{}^{3)4)} = V^0_{Rk,s}{}^{5)}$ | [kN] | 9,2 | 14,5 | 21,1 | 21,1 | 39,3 | 61,3 |
| Factor considering ductility | $k^{3)} = k_2{}^{4)} = k_7{}^{5)}$ | [-] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 6.8 | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}{}^{3)4)} = V^0_{Rk,s}{}^{5)}$ | [kN] | 11,0 | 17,4 | 25,3 | 25,3 | 47,1 | 73,5 |
| Factor considering ductility | $k^{3)} = k_2{}^{4)} = k_7{}^{5)}$ | [-] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 8.8 | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}{}^{3)4)} = V^0_{Rk,s}{}^{5)}$ | [kN] | 14,6 | 23,2 | 33,7 | 33,7 | 62,8 | 98,0 |
| Factor considering ductility | $k^{3)} = k_2{}^{4)} = k_7{}^{5)}$ | [-] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| **Steel failure with lever arm** | | | | | | | | |
| Steel failure with threaded rod grade 4.6 | | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 15,0 | 29,9 | 52,4 | 52,4 | 133,3 | 259,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 |
| Steel failure with threaded rod grade 4.8 | | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 15,0 | 29,9 | 52,4 | 52,4 | 133,3 | 259,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 5.8 | | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 18,8 | 37,4 | 65,6 | 65,6 | 166,6 | 324,8 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 6.8 | | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 22,5 | 44,9 | 78,7 | 78,7 | 199,9 | 389,7 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |
| Steel failure with threaded rod grade 8.8 | | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 30,0 | 59,9 | 104,9 | 104,9 | 266,6 | 519,7 |
| Partial safety factor | $\gamma_{Ms}{}^{2)}$ | [-] | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 | 1,25 |

## Table C3: Characteristic resistance and displacements (static and quasi-static loads)

| Anchor | | | TAP CE | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **TAP CE08** | **TAP CE10** | **TAP CE 12** | **TAP CE 12D** | **TAP CE16** | **TAP CE20** |
| **Resistance to pry-out failure** | | | | | | | | |
| Factor for non-cracked concrete | $k$ [3] = $k_3$ [4] = $k_8$ [5] | [-] | 1,0 | 1,0 | 1,0 | 1,0 | 2,0 | 2,0 |
| Partial safety factor | $\gamma_{Ms}$ [2] | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| **Resistance to concrete edge failure** | | | | | | | | |
| Outside diameter of anchor | $d_{nom}$ | [mm] | 10 | 12 | 15 | 16 | 20 | 25 |
| Effective length of anchor under shear loads | $l_f$ | [mm] | 30 | 40 | 50 | 50 | 65 | 80 |
| Partial safety factor | $\gamma_{Mc}$ [2] | [-] | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Minimum member thickness | $h_{min}$ | [mm] | 100 | 100 | 100 | 100 | 130 | 160 |
| Minimum edge distance | $c_{min}$ | [mm] | 41 | 54 | 68 | 68 | 88 | 108 |
| Minimum spacing | $s_{min}$ | [mm] | 41 | 54 | 68 | 68 | 88 | 108 |
| **Displacements under static and quasi-static loading** | | | | | | | | |
| Tension and shear load in non-cracked concrete C20/25 to C50/60 | | | | | | | | |
| Tension load and shear load | N = V | [kN] | 4,44 | 6,91 | 6,40 | 9,92 | 11,46 | 23,86 |
| Short term tension displacement | $\delta_{N0}$ | [mm] | 0,98 | 3,54 | 3,06 | 2,73 | 1,15 | 4,26 |
| Long term tension displacement | $\delta_{N\infty}$ | [mm] | 0,50 | 0,50 | 0,38 | 0,50 | 0,50 | 0,50 |
| Short term shear displacement | $\delta_{V0}$ | [mm] | 0,98 | 3,54 | 3,06 | 2,73 | 1,15 | 4,26 |
| Long term shear displacement | $\delta_{V\infty}$ | [mm] | 0,50 | 0,50 | 0,38 | 0,50 | 0,50 | 0,50 |

[1] Pull-out failure mode is not decisive
[2] [3] Parameter for design acc. to ETAG 001 Annex C
[4] Parameter for design acc. to CEN/TS 1992-4-4:2009
[5] Parameter for design acc. to prEN 1992-4:2016